# A lectotype for *Jadammina macrescens* (Brady) and emendation of *Jadammina* Bartenstein & Brand (Protozoa: Foraminiferida)

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## Introduction and historical review

H. B. Brady (*in* G. S. Brady *et al.*, 1870: 290), in a study of the foraminifera of tidal rivers of the British Isles, introduced the name *Trochammina inflata* var. *macrescens* for a ... 'nautiloid complanate form' which he regarded as related to *T. inflata* (Montagu), not on morphological grounds but on an affinity shown by the ... 'extreme tenuity of the test, its membranous nature, and its agreement in chemical relations'. This, he believed, to be the consequence of 'depauperating' in particular environments where calcium carbonate was a rare mineral element. Brady (*ibid*: 290, pl. 11, figs 5a–c) described his new variety as follows:

> Test nautiloid, complanate. Chambers numerous, thin, concave. Septal plane narrow. Texture membranous, subarenaceous, scarcely calcareous. Colour brown. Long diameter 1/65 inch [390 μm].

Nothing is said about the apertural features which were obviously taken to be the same as in *T. inflata.* Furthermore, the coiling is erroneously stated to be planispiral. Brady had a wide notion of the species concept and it would be natural that he would consider his variety *macrescens* as conspecific with *T. inflata* as expressed by his title to the description. On the other hand he did recognise differences in coiling and agglutination between the two, and concluded, somewhat ambiguously that 'pending the re-arrangement of the group, it has been thought best to give a sort of varietal distinction to the complanate specimens above mentioned; and a separate line is accorded to them, under the name *T. macrescens,* in the Table.' In this table where Brady lists the geographic distribution of the brackish water species from Britain, the variety *macrescens* is however suddenly accorded specific status and listed as *'Trochammina macrescens* nov. spec.' Subsequently, in his 'Synopsis of the British Recent Foraminifera', Brady (1887: 892) reverted to varietal status for the taxon with the annotation ... 'I have great doubt as to the propriety of retaining this form under a distinct name. The examination of a considerable series of specimens suggests that it represents only the depauperated condition of *Trochammina inflata*:—in other words, that when *Trochammina inflata* lives in pools, the water of which contains a very small proportion of mineral constituents, the test loses its firm shelly consistence and becomes little more than a chitinous envelope, so thin that the inflated contour of the segments is lost when the specimens are taken out of fluid and dried'. The last part of the sentence refers to what we now call 'collapse features'. In material from the Trinidad mangrove swamps, we have in fact seen individuals of a trochamminid which were in this 'depauperated condition' but which did not always show collapse features, and may indeed be referable to the true *T. inflata* (see also remarks by Bartenstein & Brand (1938: 384) on the preservation of *Jadammina polystoma* and *Trochammina inflata*).

Brady did not select a type specimen of *T. inflata* var. *macrescens* and as his illustrations (1870, pl. 11, figs 5a–c) showed only the general aspect of the test, the low trochospiral enrolment and collapse features in a very poorly agglutinated wall, later workers could not be sure what *macrescens* really was. In order to clarify the situation Brady's remaining syntypic specimens in the British Museum (Natural History) have been studied and a lectotype proposed. It will be shown that Brady's form represents a trochamminid species totally distinct from *T. inflata*. However, before describing the lectotype, a few other historic and taxonomic aspects of the *macrescens* problem have to be considered.

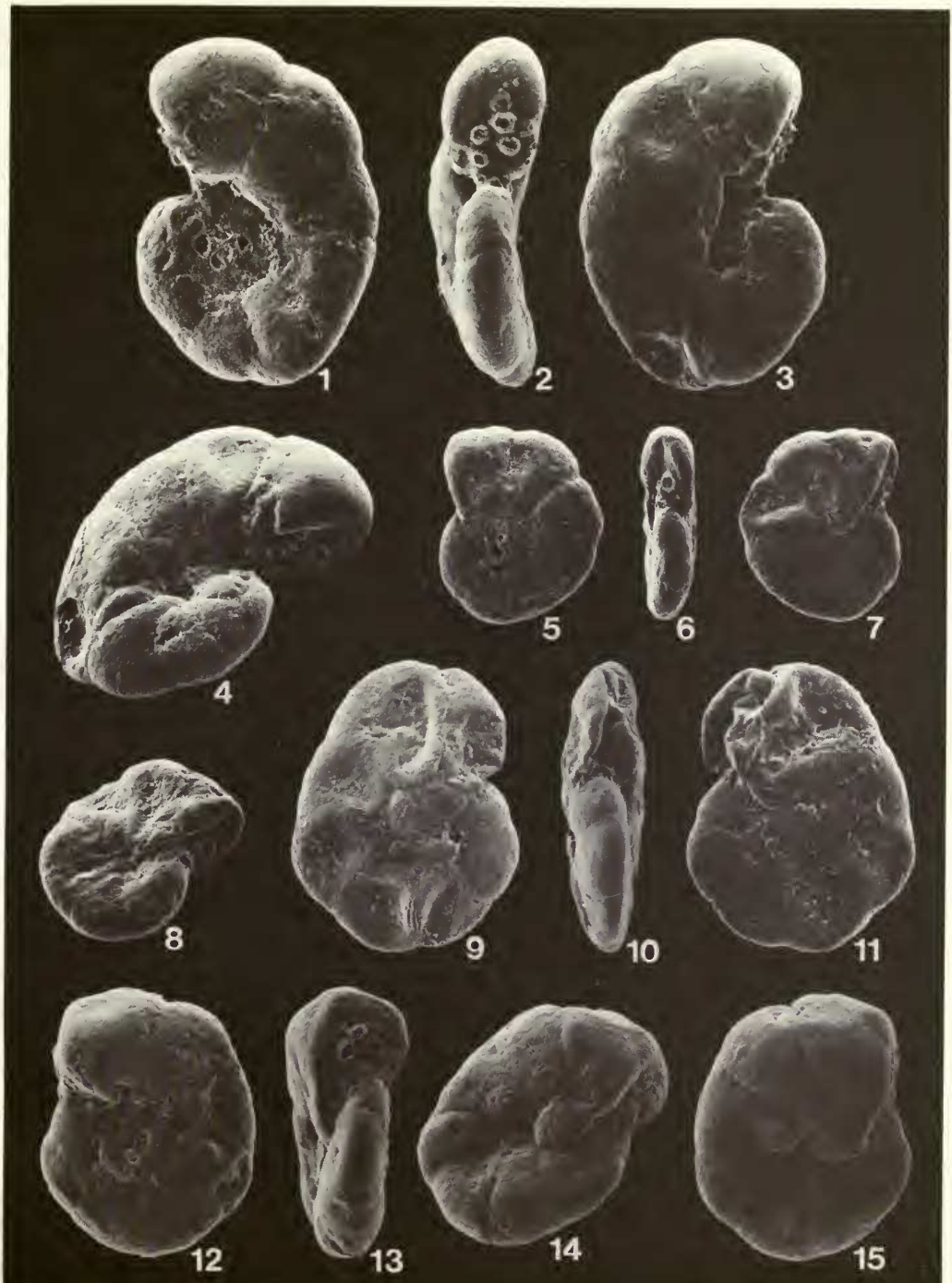
Bartenstein & Brand, and Bartenstein alone, published in 1938 two papers on the foraminifera of the tidal flats of the Jade area at Wilhemshaven, N. Germany. In the first paper they introduced *Jadammina polystoma* gen. et sp. nov., and in the second Bartenstein described the general aspects of the foraminifera of the Jade area. *J. polystoma* Bartenstein & Brand (1938: 382, figs 1–3) was described as follows:

> Gehäuse kegel-spiral, aber niedrig. Spiralseite flach, alle Kammern sichtbar, Anfangskammer und innerste Windung oft vertieft. Nabelseite eingesenkt, nur die Kammern der letzten Windung sichtbar. Bei ausgewachsenen Tieren besteht ein Umgang aus 8–10 Kammern, die breiter als hoch sind. Die Nähte sind schwach vertieft, der Gehäuse-Rand leicht gelappt. Die Nähte sind—vor allem bei älteren Tieren gut zu beobachten—schwach S-förmig geschwungen. Die Mündung besteht aus einem Mündungs-schlitz an der Basis der Endkammer sowie aus Mündungslöchern, die auf der Stirnseite der Endkammer sitzen. An den Mündungslöchern ist die Gehäusewand aufgeworfen, sodass die Mündungslöcher in kurzen, halsartigen Fortsätzen sitzen. Ihre Zahl schwankt swischen 3 und 7 Mündungslochern, der Typus besitzt 5. Die Anordnung der Löcher zueinander ist nicht regelmässig, obwohl häufig die Gestalt eines gleichschenkeligen Dreiecks erscheint (Abb. 2a–1). Schale: Pseudochitin-Tapete, in die kleine Quartzkörner vollkommen eingebacken sind; kalkfrei. Gehäuse häufig mit eingefallenen Wänden (vgl. Teil C). Farbe: braun, selten grau. Durchmesser des Gehäuses: 0·24 mm.

Bartenstein & Brand (1938: 383) presumed that Brady's *T. inflata* var. *macrescens* could also be a *Jadammina* but yet different from their *polystoma* because, they argued, Brady certainly would have seen and described the multiple aperture if it had existed. The illustrations of Brady (1870, pl. 11, figs 5a–c) however show a very low, strongly collapsed trochospire in which the apertural features are not recognisable. Bartenstein & Brand made a search for Brady's figured specimens but apparently without success and Dr K. P. Oakley of the British Museum (Natural History) stated in correspondence at the time, that they were presumed lost. In conclusion, they considered *T. inflata* var. *macrescens* and their *J. polystoma* to be different, but ecologically related, trochamminids.

Bartenstein & Brand's conclusion was accepted by some workers, however often with mixed feelings, while being refuted by others.

Phleger & Walton (1950) elevated Brady's variety to species rank. This was followed by Parker (1952: 408) who remarked that the species mentioned by Phleger & Walton (1950) ... 'should be referred to *Jadammina polystoma* Bartenstein & Brand. The two forms [*T. macrescens* and *J. polystoma*] appear to be distinct and have not been found together at the same locality'. Parker & Athearn (1959) also recognised both taxons but considered it ... 'possible that this species [*J. polystoma*] and *Trochammina macrescens* are related or even identical'; they found in Poponesset Bay, Massachusetts, that the two forms lived together. Adams & Haynes (1965), in their paper on the marsh faunas at Borth, W Wales, seem to have been the first to synonymise the two names under *Jadammina macrescens* (Brady). Bartenstein (1969) reviewed the worldwide geographic distribution of *J. polystoma* and *T. macrescens* but still continued to distinguish the two. The overall trochospiral morphology of both forms being virtually identical, he based the distinction on the apertural features only: a single interiomarginal slit in *T. macrescens* and a multiple aperture consisting of a peripheral interiomarginal slit and a variable number of areal pores, in *J. polystoma*.



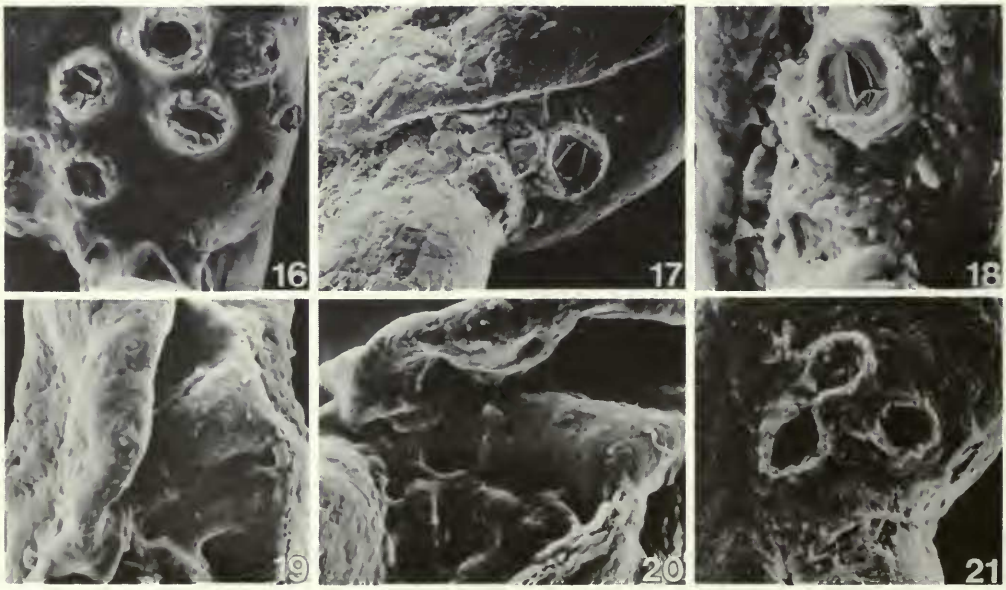

**Figs 1–15** *Jadammina macrescens* (Brady). Figs 1–4, Lectotype (ZF 4212). Spiral, edge, umbilical and oblique-umbilical views. Figs 5–8, specimen ZF 4211. Spiral, edge, umbilical and oblique-umbilical views. Figs 9–11, Paralectotype (1955.10.28.2). Spiral, edge, and umbilical views. Figs 12–15, Paralectotype (ZF 4213). Spiral, edge, oblique-umbilical and umbilical views. All ×105. Figs 1–4, from River Blyth, NE England; figs 5–8, from Montrose Basin, E Scotland, at low water; figs 9–11, locality unknown, but probably River Blyth; figs 12–15, from Loch Gruinart, Islay, W Scotland. All from brackish water. Ex Brady collection, BM(NH).

As Brady's original specimens were apparently not available and the 1870 illustration unfortunately does not show the aperture (the final chamber is strongly deformed), Bartenstein's suggestion (1969) that the aperture of *T. macrescens* is a single interiomarginal slit is subjective, interpretative and not factual.

The synonymy proposed by Adams & Haynes (1965) was also accepted by Murray (1965; 1971) and followed again by Haynes (1973: 41, pl. 1, fig. 5; pl. 2, figs 14–16; text figs 7: 1–5) who published the first revision of Brady's species using as comparative material syntypic specimens from Westport (W Ireland), deposited in the British Museum (Natural History). Haynes described *Jadammina macrescens* in detail and remarked that ... 'the apertures are frequently obscured in this delicate species which is prone to collapse on drying or burial in sediment. As, in any case, the development of the areal apertures appears to be a variable feature it becomes merely an academic exercise to attempt to distinguish *Trochammina macrescens* from *Jadammina polystoma.* After examination of the excellent material of Brady from Westport in the British Museum we agree with Parker and Athearn who suggested that these specimens were virtually identical'. Although having seen Brady's collections of *T. inflata* var. *macrescens,* Haynes did not select a lectotype. The problem has therefore remained unsettled to this day giving further occasion to discussions and speculations about whether *macrescens* and *polystoma* are in fact synonyms or not (see Scott, 1976 and Scott & Medioli, 1980).

## A lectotype for *Jadammina macrescens* (Brady)

The present writers have examined the complete syntypic series of specimens labelled *T. inflata* var. *macrescens* or '*T. inflata* brackish var', together with other material, in the Brady collection, British Museum (Natural History). The extant syntypes are from the following places listed in Brady's 1870 'Table of Localities': Rivers Wear and Blyth, Northumberland




**Figs 16–21** *Jadammina macrescens* (Brady). Apertural detail. Fig. 16, Lectotype (ZF 4212). Edge view showing interiomarginal slit in peripheral position and areal pores, ×350. Figs 17, 18, specimen ZF 4211. Oblique and edge view of interiomarginal slit and single areal pore, ×390 and ×650 respectively. Figs 19, 20, Paralectotype (1955.10.28.2). Edge and oblique views of strongly deformed apertural face, ×400 and ×475, respectively. Fig. 21, Paralectotype (ZF 4213). Edge view showing peripheral interiomarginal slit and areal pores, two of which are interconnected, ×295.

and Durham; Loch Gruinart (or Grunard), Islay, and Loch Gilp, Scotland; and Westport, Ireland. An examination of the illustrations of *T. inflata* var. *macrescens* in Brady, 1870, shows that pl. 11, figs 5a–c, are of two different individuals. The umbilical view is of a 9-chambered, and the spiral view, of an 8-chambered specimen. The apertural (edge) view, fig. 5b, which is connected with the umbilical view (fig. 5a) in Brady's illustration by a dashed line, is therefore probably the same specimen. We tried to find the individuals which served as the originals to Brady's figures and encountered a specimen (reg. no. 1955.10.28.2) marked 'Syntype. Brackish water' (the locality is uncertain, but is probably River Blyth) which corresponds closely to his illustration of the spiral view (fig. 5c). We have re-illustrated it by Scanning Electron Microscopy in our Figs 9–11, 19, 20. Compare in particular the outline on the test, the number of chambers, details at the base of the first chamber of the final whorl, and the collapse features. The final chamber is strongly deformed through collapse. The detailed views of the inturned apertural face (Figs 19, 20) show at least 3, possibly 4, areal pores as are developed in *Jadammina polystoma.* The primary aperture can be seen best in the general edge view, Fig. 10. It is an *interiomarginal peripherally situated narrow slit.* In our opinion, the features of this individual are the same as those of *J. polystoma.* But as the aperture face is strongly deformed and the presence of areal pores may be disputed, it was considered best not to select it as lectotype. The other figured specimen shown in Brady's pl. 11, figs 5a, b, could not be found and apparently does not exist any more in the British Museum (Natural History) Collections.

Instead, a well preserved specimen from Brady's syntypic slide reg. no. 64.4.3.37, from the brackish waters of the River Blyth, Co. Durham, NE England (long. 1°33′W, lat. 55°08′N), has been selected and is here formally designated as lectotype of *Jadammina macrescens* (Brady) (= *Trochammina inflata* var. *macrescens* Brady, 1870). It is illustrated by Scanning Electron Microscopy in our Figs 1–4, 16, and is re-registered under the BM(NH) no. ZF 4212.

Description (lectotype). Test free, very low dextral trochospire; tendency to planispiral coiling in adult test. Outline in umbilical and spiral view elongate-oval, faintly lobate in final portion; in edge view, compressed with rounded peripheries. Umbilical side with well defined umbilical depression, spiral side also depressed in early part through onlap of rather inflated chambers of final whorl on less inflated proceedings chambers. Final whorl of 9 chambers, total number of chambers not determined but probably between 18 and 20. Radial sutures spirally and umbilically well defined, straight to slightly incurved. Aperture multiple: a single interiomarginal slit in peripheral position and 7 or 8 rounded areal openings surrounded by granular rims. Wall agglutinated, organic base dominant, probably single layered and imperforate. Colour of test, dark brown. No collapse features, but spiral wall of early chambers destroyed.

Dimensions (lectotype). Maximum umbilical and spiral diameter of test 490 μm, minimum diameter 290 μm, thickness (axial height) 110 μm. Radial and maximum tangential diameter of final chamber 200 μm, thickness about 145 μm. Height of interiomarginal aperture 10 μm, maximum diameter of areal apertures 30 μm.

Variation (paralectotypes). Two paralectotypes are selected and figured herein. The first, reg. no. 1955.10.28.2 (Figs 9–11, 19, 20), is probably from the River Blyth, like the lectotype. Its morphology has already been discussed above, save for its dimensions which are: maximum and minimum diameter of test, respectively 390 and 300 μm, and thickness (axial height) 110 μm. The second paralectotype (ZF 4213) comes from slide no. 64.4.3.34, Loch Gruinart (Grunard), Isle of Islay, W Scotland (long. 6°20′W, lat. 55°49′N), and has maximum and minimum test diameters of 370 and 300 μm respectively, and a thickness (axial height) of 150 μm. It has an exceptionally well preserved test, especially in the apertural face. It is illustrated in Figs 12–14, 21. It differs from the lectotype in having a tighter coil, more globose early chambers, a more restricted umbilicus (produced by embracing lobe of last formed chamber) and having fewer areal pores.

OTHER SPECIMEN. A further specimen is illustrated (Figs 5–8, 17, 18 (ZF 4211)) from Montrose Basin, E Scotland (long. 2°31′W, lat. 56°43′N). It is from the Brady Collection (ex slide 64.4.3.18), but is not from the syntypic series. It is small, and has only one areal pore. Dimensions are: maximum and minimum diameters in umbilical and spiral views, respectively 260 and 230 μm, thickness (axial height) 80 μm.

REMARKS. The lectotype is virtually identical in its morphological features with Bartenstein and Brand's type specimen of *Jadammina polystoma* (Bartenstein & Brand, 1938, figs 1a–c (on p. 382)), excepting in the number of areal pores which is 5 in the latter against 7 or 8 in the former. As has been shown by Bartenstein & Brand (1938, fig. 2) the number of pores is a feature that varies individually. Indeed, we show a paralectotype (ZF 4213) with 4 areal pores (two separate, and two interconnected) and a further specimen (ZF 4211) with only a single pore. Of primary taxonomic importance in *macrescens* and *polystoma* is the peripheral position of the interiomarginal aperture which gives the superficial appearance of planispiral enrolment. The early enrolment of the lectotype is distinctly trochospiral, it has therefore to be assumed that during early coiling the position of the interiomarginal aperture was in an umbilical rather than peripheral position. This apparent planispiral enrolment in the adult was the reason for Brady's (1870) mistaken interpretation of the coiling as 'nautiloid complanate'.

In conclusion, *T. inflata* var. *macrescens* is a *Jadammina.* Bartenstein & Brand's specific name *polystoma* clearly falls into synonymy with Brady's taxon whose correct name is *Jadammina macrescens.*

## Emendation of *Jadammina* Bartenstein & Brand, 1938

Following our morphological description of the type-species, the generic definition is emended herein.

EMENDED GENERIC DEFINITION. Test free, low trochospire, with tendency to planispiral coiling in adult test. Wall agglutinated, imperforate. Aperture multiple, consisting of single interiomarginal slit in peripheral position and one or more areal pore(s) in lower part of septum; pore(s) surrounded by projecting rims.

TYPE SPECIES. *Trochammina inflata* var. *macrescens* Brady, 1870. Recent brackish water. Worldwide in temperate to cool regions unknown in subtropical or tropical mangrove areas.

REMARKS. *Jadammina* differs from *Trochammina* Parker & Jones (type species: *Nautilus inflatus* Montagu, 1808) essentially in apertural features. *Trochammina* has an interiomarginal slit-like umbilical aperture intermediate between the axis of enrolment and the periphery of the test, never in a peripheral position, whereas *Jadammina* has a multiple aperture consisting of a single interiomarginal slit in a peripheral position and supplementary areal pore(s) in the lower part of the septum. *Jadammina* is therefore quite distinct from *Trochammina,* not a junior synonym of the latter as stated by Scott & Medioli as recently as 1980 (p. 44), and a genus in its own right.

## Acknowledgements

The SEM photographs, taken by one of us (J.E.W.), were printed by the staff of the Electron Microscope Unit, BM(NH). The senior author's research was funded in part by the Fonds National Suisse. The typescript was read by Drs C. G. Adams and L. R. M. Cocks, BM(NH).

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Manuscript accepted for publication 3 June 1983